(A) IDENTIFICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT(s):	Korpela et al.	CONF. NO.:	9028
SERIAL NO.:	10/030,286	ART UNIT:	2616
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TITLE:	METHOD FOR TRANSMITTING A SEQUENCE OF SYMBOLS		
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APPELLANTS' BRIEF

(37 C.F.R. §1.192)

This is an appeal from the final rejection of the claims in the subject application. A Notice of Appeal was mailed on May 16, 2008 along with a Pre-Appeal Brief Request for Reconsideration. A Panel Decision maintaining the Final Rejection of June 25, 2008 was mailed on July 22, 2008.

(B) TABLE OF CONTENTS

(C) REAL PARTY IN INTEREST

Nokia Corporation

(D) RELATED APPEAL AND INTERFERENCES

There are no directly related appeals or interferences regarding this application.

(E) STATUS OF THE CLAIMS

Claims 1-14 and 16-21 are pending in the application.

Claim 15 has been cancelled.

Claims 1, 6-14, 16 and 17 have been finally rejected.

Claims 18-21 are allowed.

Claims 2-5 are objected to.

The claims on appeal are 1, 6-14, 16 and 17.

(F) STATUS OF AMENDMENTS FILED SUBSEQUENT TO FINAL REJECTION

No amendment was filed under 37 C.F.R. 1.116.

(G) SUMMARY OF THE CLAIMED SUBJECT MATTER

In brief, the claimed invention is a method for transmitting a certain sequence of symbols, where a frame is constructed of a certain number of consecutive symbols. The symbols belonging to the sequence are transmitted using at least two antennas wherein each antenna has a different channel coefficient to a receiver. The transmission of the sequence of symbols is with a certain transmission pattern, which indicates through which antenna each symbol is transmitted. The transmission of the sequence of symbols is started from a predefined antenna and the transmission pattern is started from the beginning in the beginning of each frame. Also claimed is an apparatus, a network element and computer program product for controlling the transmission of a sequence of symbols.

The advantage of the claimed invention is that a receiver knows which antenna was used to transmit a sequence. Thus the correct channel coefficient can be applied to the received signal sequence so as to maximize the probability of correctly receiving the symbol sequence.

The appealed independent claims are:

1. A method for transmitting a certain sequence of symbols, said method comprising,

constructing a frame (Figs. 2 & 3, 2-11) of a certain number of consecutive symbols (p.4, lines 33-34),

transmitting (p.9, lines 23-24) the symbols belonging to the sequence using at least two antennas (Fig. 7, 721, 722, p. 13, lines 30-31),

wherein the transmission of each symbol of the sequence of symbols is with a certain transmission pattern (Fig. 4, 404; p. 10, lines. 10-13) that indicates through which transmission antenna each transmitted symbol is transmitted,

starting the transmission of the sequence of symbols from a predefined antenna (p. 10, lines 12-13), and

enabling a receiver to associate a correct transmission antenna specific channel coefficient with each transmitted symbol by starting the transmission pattern from the beginning in the beginning of each frame (p.8, lines 7-8)

12. An apparatus (Fig. 7, 700) comprising:

a controller (Fig. 7, 701; p. 13, lines 16-17) for controlling the transmission of each symbol of a sequence of symbols according to a certain transmission pattern (p.13, lines 15-17) through at least two antennas (Fig. 1, 721, 722), said pattern indicating through which transmission antenna each transmitted symbol is transmitted (p.10, lines 10-13),

an indicator (Fig. 7, 702; p. 13, lines 21-23) for indicating the antenna from which to transmit the first symbol belonging to the sequence, and

a starter (Fig. 7, 703) configured to enable a receiver to associate a correct transmission antenna specific channel coefficient with each transmitted symbol by starting the transmission pattern from the beginning in the beginning frame (p.13, lines 23-25)

13. A network element (Fig.7, 710; p.13, ll.29-30) comprising:

a controller (Fig.7, 701; p.13, lines 16-17) for controlling the transmission of each symbol of a sequence of symbols according to a certain transmission pattern (p.13, lines 15-17),

at least two antennas (Fig.7, 721, 722) to transmit said sequence, said pattern indicating through which transmission antenna each transmitted symbol is transmitted (p.10, lines 10-13)

an indicator (Fig.7, 702; p.13, lines 21-23) for indicating the antenna from which to transmit the first symbol belonging to the sequence, and

a starter (Fig. 7, 703) configured to enable a receiver to associate a correct transmission antenna specific channel coefficient with each transmitted symbol by starting the transmission pattern from the beginning in the beginning of a frame (p. 13, lines 23-25)

17. A computer program product comprising:

a computer useable medium having computer readable code embodied therein for causing a computer to activate functions of a device, the computer readable code in the computer program product comprising:

a computer readable code for causing a computer to construct a frame of a certain number of consecutive symbols (p.4, lines 33-34),

a computer readable code for causing a computer to transmit (p.9, lines 23-24) the symbols belonging to the sequence using at least two antennas (Fig.7, 721, 722; p.13 lines 30-31),

wherein the transmission of each symbol of the sequence of symbols is with a certain transmission pattern (Fig.4, 404; p.10, lines 10-13) that indicates through which transmission antenna each transmitted symbol is transmitted,

a computer readable code for causing a computer to start the transmission of the sequence of symbols from a predefined antenna (p.10, lines 12-13), and

a computer readable code for causing a computer to enable a receiver to associate a correct transmission antenna specific channel coefficient with each transmitted symbol by starting the transmission pattern from the beginning in the beginning of each frame (p.8, lines 7-8)

The following dependent claims are being separately argued:

6. A method according to claim 1, wherein each frame comprises a certain number of consecutive time slots and each time slot comprises a certain number of consecutive symbols, and said method further comprises transmitting one symbol belonging to the sequence of symbols in each time slot.

7. A method according to claim 1, wherein each frame comprises a certain number of consecutive time slots and each time a lot comprises a certain number of consecutive symbols, and said method further comprises transmitting at least one symbol belonging to the sequence of symbols in each time slot.

8. A method according to claim 1, wherein each frame comprises a certain number of consecutive time slots and each time slot comprises a certain number of consecutive symbols, and said method further comprises transmitting at least in one of the time slots at least one symbol belonging to the sequence of symbols.

9. A method according to claim 1, wherein the length of the transmission pattern is larger than the length of the frame (p.10, lines 3 and 4; p.11, lines 11 and 12; p.13, line 10).

10. A method according to claim 1, said method further comprising starting the transmission of the sequence of symbols from the primary antenna that transmits a common pilot signal (p.8, lines 3 and 4).

14. A network element according to claim 13, wherein said network element comprises a radio network controller of a spread spectrum system (p.14, lines 2-4).

16. A network element according to claim 14, wherein said network element comprises a base station of a spread spectrum system (p.13, lines 32-33)

(H) GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Whether claims 1, 6-8 and 11-13 are anticipated under 35 U.S.C. 102(b) by U.S. Patent No. 6,185,258 (Alamouti).

2. Whether claims 9 and 17 are obvious under 35 U.S.C. 103(a) over U.S. Patent 6,185,258 (Alamouti).

3. Whether claims 10, 14 and 16 are obvious under 35 U.S.C. 103(a) over 6,185,258 (Alamouti) in view of admitted prior art in the specification.

(I) Argument

A. Rejection under 35 U.S.C. 102(e) over U.S. Patent No. 6,185,258 (Alamouti).

1. Claims 1, 12 and 13.

Claim 1 recites **constructing a frame of a certain number of consecutive symbols**.

In column 3, lines 30-32, Alamouti speaks about "blocks", but a block as designated cannot equal the concept of frame in the claimed invention. The decisive feature about Alamouti's blocks is the number of antennas because the number of symbols in a block must be equal to the number of antennas. In his example, Alamouti considers n=2 so each block has two symbols. However, when it comes to actual transmission, Alamouti multiplies and processes the original symbols so that each group of two symbols actually results in four symbols. For example, the block of symbols s_o and s_1 becomes a group of four distinctive symbols s_0, s_0^*, s_1, $-s_1^*$. So, even if one (mis)interprets the sequence (s_o and s_1) as a frame, one must note that in the actual transmission these symbols will never occur as consecutive symbols but as simultaneously transmitted symbols from two different antennas. On the other hand, if one takes any pair of truly consecutive symbols from the transmission, like s_0 and $-s_1^*$, for example, one notes that these only constitute a part of the whole symbol sequence s_0, s_0^*, s_1, $-s_1^*$ to be transmitted. Thus Alamouti fails to disclose anything that would correspond to the claimed feature recited in bold typeface above.

In addition, the Examiner states in section A on p. 8 of the Final Rejection that the symbols shown in Table I (col.4, lines 20-24) must be transmitted over a period of time since they cannot go on indefinitely, and therefore "a frame...must be constructed" (p.3, first paragraph). He also states on p.8, paragraph A, that the present claims are not limited to exclude the teaching of Alamouti. However, Table I shows a series of dots after the last transmitted symbol (t+5T). Thus the sequence could very well be non-

periodic and go on indefinitely.

It is well settled that:

"To serve as an anticipation when the reference is silent above the asserted inherent characteristic, such gap in the reference may be filled with recourse to extrinsic evidence. Such evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill." See *Continental Can Co. USA Inc. v. Monsanto Co.,* 20 USPQ2d 1746, 1749.

Here, as explained above, the frame recited in all independent clams is not necessarily present in Alamouti, and certainly not a frame of a certain number of consecutive symbols as recited in claim 1. Nor would such a frame be recognized as present by persons of ordinary skill. Thus there is no need for the claims to additionally exclude the teaching of Alamouti since they already do so.

Claims 1, 12 and 13 recite that the **transmission of each symbol of the sequence of symbols with a certain transmission pattern that indicates through which transmission antenna each transmitted symbol is transmitted**.

This is not disclosed in Alamouti, or if Alamouti does disclose it, it causes a further contradiction with the definition of frame discussed above. The example in column 4, lines 14-23, in Alamouti discloses a transmission pattern, but also names the sequence of signals as $\{s_0, s_1, s_2, s_3, s_4, s_5 \ldots\}$. What Alamouti seems to disclose in said example is a transmission pattern that defines the first and second symbol to be transmitted simultaneously through parallel antennas, then the third and fourth symbol to be transmitted simultaneously through parallel antennas and so on, but not in **consecutive symbol periods**. Between each such transmission instant there comes another symbol period during which a pair of derivative signals (such as s_0^*, $-s_1^*$) is transmitted that do not even belong to the sequence of signals. One would be tempted to make an

interpretation according to which each symbol of the sequence $\{s_0, s_1, s_2, s_3, s_4, s_5 ...\}$ through the second antenna. But then again in neither of these subgroups can one find consecutive symbols of the original symbol sequence. So there is no disclosure of the claimed "frame of a certain number of consecutive symbols".

Further, in section B on p.9 of the Final Rejection the Examiner states that Symbols s_0 and s_1 are respectively transmitted by antennas 11 and 12 in time slot t, the symbols s_2 and s_3 are respectively transmitted by antennas 11 and 12 in time slot t+2T, etc. However, this does not indicate through which antenna each transmitted symbol is transmitted as recited in all of the present independent claims.

Claim 1 recites **starting the transmission of the sequence of symbols from a predefined antenna**.

As pointed out above, Alamouti names $\{s_0, s_1, s_2, s_3, s_4, s_5 ...\}$ as his sequence of signals, which one could possibly equate with the claimed concept "sequence of symbols". But the transmission of Alamouti's sequence begins by simultaneously transmitting the first pair of the sequence! It is impossible to say that the transmission would have started from a predefined antenna because the transmission simultaneously started from two antennas.

Note that claims 12 and 13 recite the similar language of "an indicator for indicating the antenna from which to transmit the first symbol belonging to the sequences...". It submitted that "the antenna" is singular.

The Examiner states in the fourth paragraph on p.3 of the Final Rejection that Alamouti discloses "...starting the transmission of the sequence of symbols from a predefined antenna..." as recited in claim 1. Alamouti names $\{s_0, s_1, s_2, s_3, s_4, s_5 ...\}$ as his sequence of signals. But the transmission of Alamouti's sequence begins simultaneously transmitting the first pair of the sequence. It is impossible to say that the transmission would have started from the presently claimed "...a predefined antenna..."

because the transmission simultaneously starts from two antennas in Alamouti.

In section C on p.9 of the Final Rejection the Examiner states that "a predefined antenna" does not exclude the situation where more than one predefined antenna is used. However, as stated above, if there are only two antennas present as in Alamouti, and they simultaneuosly transmit, then there is no such thing as a "predefined" antenna.

Claims 1, 12 and 13 recite **enabling a receiver to associate a correct transmission antenna specific channel coefficient with each transmitted symbol by starting the transmission pattern from the beginning in the beginning of each frame.**

This is the most important argument against Alamouti since it sums up all the contradictions between frames and transmission patterns referred to above. In his Table 1, Alamouti gives a transmission pattern that is six symbol periods long. He does not specifically disclose starting that transmission pattern from the beginning at all except the natural interpretation that the transmission pattern starts at the simultaneous transmission of symbols s_0 and s_1 at the leftmost column of the table. Above applicants had already shown how the concept of a frame does not even exist in Alamouti, or is at least very much open to different interpretations. It is simply impossible to see any starting from the beginning in Table 1, at least in the claimed sense which requires starting the transmission pattern from the beginning at the beginning of *each* frame. Additionally, Alamouti fails to disclose the first part of this claimed feature, i.e., enabling a receiver to associate a correct transmission antenna specific channel coefficient with each transmitted symbol. This is because Alamouti does it the other way round. He uses the transmitted (and received) symbols to calculate the channel coefficients (see equations 17 in Alamouti). Thus Alamouti could at most be said to *derive* antenna specific channel coefficients *from* transmitted symbols.

The Examiner states in section D on pages 9-10 of the Final Rejection that Eq. (3) in Alamouti associates the channel coefficients h_0 and h_1 "with the received signal r(t) comprising the signals s_i and s_j transmitted from associated antenna 11 and antenna 12 at time slot t". In fact, Alamouti's receiver receives *something* during a time slot, which *something* is a combination of what was transmitted through the first antenna and what was transmitted through the second antenna. Alamouti's receiver *does not need* to make any difference between the channel coefficients h_0 and h_1 because his special way of negating and conjugating the symbols between time slots ensures that for each received time slot, the estimate calculated from the received payload signal is completely symmetrical with respect to the channel coefficients. Alamouti's special form of handling the transmitted symbols means that associating a correct *transmission antenna specific* channel coefficient with each transmitted symbol (which is one of the presently claimed features in all independent claims) is unnecessary.

For all of the above reasons, the rejection of claims 1, 12 and their dependent claims as anticipated by Alamouti should be reversed.

2. Claims 6, 7 and 8

Claim 6 recites "...transmitting one symbol belonging to the sequence of symbols in each time slot". Claims 7 and 8 have similar language. In Alamouti, there is no disclosure of this feature since as explained above, the sequence therein can go on indefinitely. For this additional reason these claims are patentable.

B. Rejection under 35 U.S.C. 103(a) over U.S. Patent No. 6,185,258 (Alamouti).

1. Claim 9

Claim 9 depends from claim 1, which, as explained above, is allowable.

Further, the claimed invention is for the problem of determining the correct channel coefficient, while Alamouti is for the different problem of transmission errors. Thus, all

of he above-discussed features are not obvious in view of Alamouti, *i.e.*, it is not obvious to modify Alamouti to have the claimed features, see MPEP 2143.01. Hence the rejection of claim 9 should be withdrawn for this additional reason.

In section F on pages 10-12 of the Final Rejection the Examiner states that "Nowhere in MPEP 2143.01 states that it would not be obvious to modify the prior art to arrive at the claimed features because the prior art is for different problem than the invention". However, in MPEP 2143.01, Rev. 6, Sept. 2007, p.2100-139, right column, first full paragraph, it is stated that the "nature of the problem to be solved" is to be considered when modifying a reference citing *Ruiz v. A.B. Chance Co.*, 69 USPQ2d, 1686, 1690. Also the Examiner cites *In re Rose,* 105 USPQ 237, for the proposition that a change in length is not patentable. However, the facts therein relate to a lumber package, where changes in the length are predictable. It is respectfully submitted that in the complex presently claimed methods, apparatuses, networks elements and computer program products, the results of a change in the length are not predictable.

Thus, it is respectfully submitted that many essential elements need for a *prima facie* rejection under 35 U.S.C. 102(e) and 103(a) are lacking, and the rejections should be reversed.

2. Claim 17

Claim 16 recites all of the above-discussed limitations of claim 1. Thus the rejection of claim 17 should be reversed for the reasons given above.

Further, as no computer program product reader is disclosed in Alamouti it is not obvious to provide such a product for it.

C. Rejection under 35 U.S.C 103 (a) over U.S. Patent No. 6,185,258 (Alamouti) in view of the admitted prior art.

1. Claims 10, 14, and 16

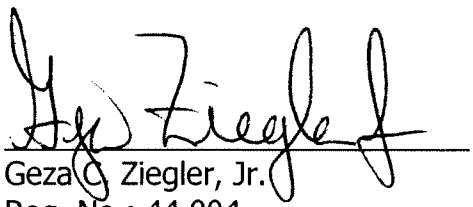
Since the admitted prior art also fails to disclose the above-discussed and claimed features, combining it with Alamouti does not result in the claimed invention. Thus the rejection of claims 10, 14 and 16 should be reversed.

Further, there is no reason to combine Alamouti with the admitted prior art in the first place.

For all the foregoing reasons, it is respectfully submitted that all of the claims now present in the application are clearly novel and patentable over the prior art of record, and are in proper form for allowance. Accordingly, favorable reconsideration and allowance is respectfully requested. Should any unresolved issues remain, the Examiner is invited to call Applicant's attorney at the telephone number indicated below.

The Commissioner is hereby authorized to charge payment of $510 for this Brief, $120 for a 1 month extension of time and for any other fees associated with this communication or credit any over payment to Deposit Account No. 16-1350.

Respectfully submitted,



28 AUGUST 2008
Date

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(J) CLAIM APPENDIX

1. A method for transmitting a certain sequence of symbols, said method comprising,

-constructing a frame of a certain number of consecutive symbols,

-transmitting the symbols belonging to the sequence using at least two antennas,

-wherein the transmission of each symbol of the sequence of symbols is with a certain transmission pattern that indicates through which transmission antenna each transmitted symbol is transmitted,

-starting the transmission of the sequence of symbols from a predefined antenna, and

-enabling a receiver to associate a correct transmission antenna specific channel coefficient with each transmitted symbol by starting the transmission pattern from the beginning in the beginning of each frame.

2. A method according to claim 1, wherein:

-the length of the transmission pattern is shorter than the length of a frame, and

-the length of the frame is not a multiple of the length of the transmission pattern,

said method further comprising during each frame:

-repeating the transmission pattern until the length of the rest of the frame, which length is the length of the transmission pattern multiplied by the number of the

repetition times within the frame subtracted from the length of the frame, is less than the length of the transmission pattern, and

-thereafter using only a certain part having a length which is the length of the rest of the frame of the transmission pattern.

3. A method according to claim 2, further comprising selecting the part of the transmission pattern from the beginning of the transmission pattern.

4. A method according to claim 2, wherein the length of the transmission pattern is an even number and the length of the frame is an odd number.

5. A method according to claim 4, further comprising transmitting the sequence of symbols using a first antenna and a second antenna, wherein the transmission pattern is an alternating pattern and the length of the transmission pattern is two.

6. A method according to claim 1, wherein each frame comprises a certain number of consecutive time slots and each time slot comprises a certain number of consecutive symbols, and said method further comprises transmitting one symbol belonging to the sequence of symbols in each time slot.

7. A method according to claim 1, wherein each frame comprises a certain number of consecutive time slots and each time slot comprises a certain number of consecutive symbols, and said method further comprises transmitting at least one symbol belonging to the sequence of symbols in each time slot.

8. A method according to claim 1, wherein each frame comprises a certain number of consecutive time slots and each time slot comprises a certain number of consecutive symbols, and said method further comprises transmitting at least in one of the time slots at least one symbol belonging to the sequence of symbols.

9. A method according to claim 1, wherein the length of the transmission pattern is larger than the length of the frame.

10. A method according to claim 1, said method further comprising starting the transmission of the sequence of symbols from the primary antenna that transmits a common pilot signal.

11. A method according to claim 1, said method further comprising transmitting the sequence of symbols in a downlink direction in a cellular network.

12. An apparatus comprising:

a controller for controlling the transmission of each symbol of a sequence of symbols according to a certain transmission pattern through at least two antennas, said pattern indicating through which transmission antenna each transmitted symbol is transmitted,

-an indicator for indicating the antenna from which to transmit the first symbol belonging to the sequence, and

-a starter configured to enable a receiver to associate a correct transmission antenna specific channel coefficient with each transmitted symbol by starting the transmission pattern from the beginning in the beginning of a frame.

13. A network element comprising:

a controller for controlling the transmission of each symbol of a sequence of symbols according to a certain transmission pattern,

at least two antennas to transmit said sequence, said pattern indicating through which transmission antenna each transmitted symbol is transmitted,

-an indicator for indicating the antenna from which to transmit the first symbol belonging to the sequence, and

-a starter configured to enable a receiver to associate a correct transmission antenna specific channel coefficient with each transmitted symbol by starting the transmission pattern from the beginning in the beginning of a frame.

14. A network element according to claim 13, wherein said network element comprises a radio network controller of a spread spectrum system.

16. A network element according to claim 14, wherein said network element comprises a base station of a spread spectrum system.

17. A computer program product comprising:

a computer useable medium having computer readable code embodied therein for causing a computer to activate functions of a device, the computer readable code in the computer program product comprising:

-a computer readable code for causing a computer to construct a frame of a certain number of consecutive symbols,

-a computer readable code for causing a computer to transmit the symbols belonging to the sequence using at least two antennas,

-wherein the transmission of each symbol of the sequence of symbols is with a certain transmission pattern that indicates through which transmission antenna each transmitted symbol is transmitted,

-a computer readable code for causing a computer to start the transmission of the sequence of symbols from a predefined antenna, and

-a computer readable code for causing a computer to enable a receiver to associate a correct transmission antenna specific channel coefficient with each transmitted symbol

by starting the transmission pattern from the beginning in the beginning of each frame.

(K) EVIDENCE APPENDIX

N/A

(L) RELATED PROCEEDINGS APPENDIX

N/A